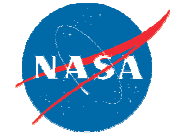


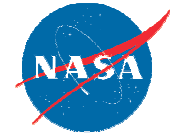
# How NASA/JPL Infuses SBIR-Developed Technologies into Applications

**Dr. Carol R. Lewis**  
**Jet Propulsion Laboratory**  
**JPL SBIR Technology Infusion Manager**



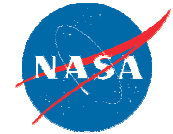
# Outline

- Overview
- Criteria for Infusion Success
- Small Companies – Strengthening Your Position
- Infusion Success inputs from Two Small Companies
- What's Working in Infusing Technology (JPL/NASA view)
- Alignment with Mission Directorate Needs
- Perspective: Distribution of Sales from NASA SBIR Phase II Projects
- Advantages of Multiple Awards
- Access to Primes
- ROSES NRA (for SMD)
- Establishing Points of Contact
- Acknowledgements



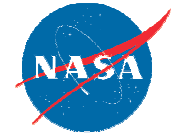
## Technology Infusion - Overview

- NASA has recently taken additional steps to increase the utilization of SBIR-developed technology in its programs and missions.
  - Each NASA center has its own SBIR Technology Infusion Manager (SBIR TIM) who works with small business SBIR/STTR contractors and NASA programs and projects to advance the utilization of the technologies the companies are developing.
  - NASA Headquarters has taken an active role in preparing the annual program solicitation to ensure a close alignment with NASA future technology requirements, and to integrate the SBIR/STTR work with other research and development activities supported by NASA.



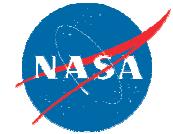
## Criteria for Infusion Success

- SBIR infusion success is measured in several ways.
  - Technology directly picked up by a flight project, mission or instrument.
  - Technology targeted for further specific development, under an advanced technology program which a flight project, mission or instrument supports.
  - Technology significantly benefits direction of overall portfolio.
  - Small business either (a) sells their technology to a larger company, or (b) is bought out by a larger company, which in turn incorporates the technology into one of their product lines and/or uses it on a flight program.



# Small Companies – Strengthening Your Position

- Per Irene Yachbes of Honeybee Robotics:
  - (1) "Involve yourself and educate yourself about NASA's needs continuously",
  - (2) "When a new NASA SBIR solicitation comes around, be sure that you understand NASA's needs well enough to respond well",
  - (3) "When you have received a Phase 1 award, establish a good relationship with your COTR [NASA contract monitor]",
  - (4) "Keep in touch to inform them of your progress",
  - (5) "...generate a buzz in the community about your work. Find out who can be end-users other than just your COTR", and
  - (6) "Don't let your SBIR project end with a completed Phase 1 or Phase 2. You must actively market yourself in the NASA community".



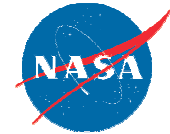
## (1/3) Paragon's Infusion Success Recommendations from the Company's Point of View

- Encourage and reward innovation.
  - Ask employees at multiple levels for their inputs.
  - Conduct initial, pre-SBIR research to develop innovation's potential.
  - Provide innovators with appropriate responsibility and authority.
- Align innovation with customer needs.
  - Understand needs and thoughts of the SBIR technical point of contact.
  - Make sure to talk with potential customers prior to blackout period.
  - Maintain open communication with technical point of contact and customers.



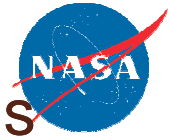
## (2/3) Paragon's Infusion Success Recommendations from the Company's Point of View

- Propose innovation along with development plan.
  - Understand customer; clearly address their needs and requirements.
  - Explain significance and benefits of the innovation for the customer.
  - Build the end goal (Phase III) into the early Phase proposals.
  - Don't overpromise in Phase I; make sure to set and review requirements.
  - Clearly state task objectives and anticipated outcomes.
  - Accommodate updated customer requirements.
  - Conduct well-disciplined reviews with the customer, for mid-course corrections.



## (3/3) Paragon's Infusion Success Recommendations from the Company's Point of View

- Perform to budget and schedule.
  - Establish clear plan that allows for mid-course corrections.
  - Stick to the plan – resist temptation to pursue tangents.
- Commit to, and invest in, the development program.
  - Commit IRAD funds to supplement/complement SBIR efforts.
  - Highlight company commitments/investments.



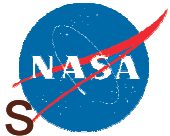
## (1/3) Invocon's Infusion Success Recommendations from the Company's Point of View

- Understand and take advantage of customer need.
  - Proper timing is critical.
- Take advantage of short schedules – they can favor agile small companies.
- Focus on technologies that are easy to sell.
  - Simple, readily implemented, high value solutions are best.
  - Give the customer a good deal for their investment.
  - Evaluate customer needs and best meet customer priorities for cost, performance, and schedule.
- Build on your company's previous successes.
  - Build customer confidence with your experience.



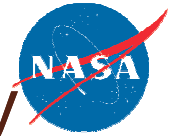
## (2/3) Invocon's Infusion Success Recommendations from the Company's Point of View

- Define a product that satisfies the customer need, and provides customer with operational vision.
  - Demonstrate that your company understands the key issues: e.g. schedule, price, service, customer training, spares/redundancy, reliability, compatibility with existing operations, product flexibility to meet contingencies, and production quality documentation.
  - Provide customer with best value solution.
- Take advantage of, and fill, market niches.
  - More productive than competing head-on with large companies.
- Be selective in what technology areas you compete.



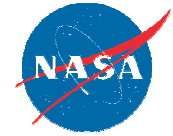
## (3/3) Invocon's Infusion Success Recommendations from the Company's Point of View

- Work closely with influential advocates within the customer organization.
  - Essential to successfully introduce a new product.
  - Advocates will present new product in a positive light, and increase odds of it being successfully adopted.
- Communicate openly and often with customer.
  - Single point of contact increases accuracy of communication.
  - Communicate on both formal and informal levels.
- Efficient program management, emphasizing what's important to customer.
- Carefully staff with talent that is a best fit to the work being done.
- Cross-trained personnel provide significant competitive advantage.



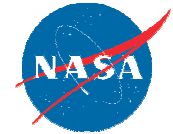
## (1/3) What's Working in Infusing Technology

- Focusing on technologies that have clear economic and/or risk reduction impact.
  - e. g. significant savings in design time/effort, mass, volume, power, integration costs, etc.
- Emphasizing technical areas where other NASA funding sources are lacking.
- Effectively utilizing JPL engineering staff and project/mission people to attract excellent proposals; e. g. , publicizing SBIR solicitation at relevant technical conferences.
- Publicizing SBIR successes, so that program and project managers can see concrete examples of the benefits.



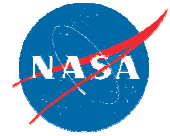
## (2/3) What's Working in Infusing Technology

- COTRs/Technical monitors who:
  - Make the small business aware of NASA technology requirements and effectively "champion" the technology to NASA programs and projects.
  - Communicate closely with the small business and ensure that it is on track towards NASA applications, including redirecting the SBIR technical focus if a planned application should dry up.
- Having small business interact closely with the JPL technical monitor and JPL SBIR Program Office, at an early stage, and tailor their SBIR work to align with NASA needs.
  - Successful infusion often requires specialized knowledge of how the relevant technology dovetails with NASA-specific mission needs.



## (3/3) What's Working in Infusing Technology

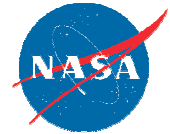
- Company has realistically assessed prospective NASA applications, including specific projects, instruments or advanced technology programs - and confirmed interest via direct communication and contacts.
- Company has a realistic, clearly defined plan and mechanism to proceed beyond Phase 2, either via their internal funding, seeking non-SBIR NASA funds, venture capital, teaming with a larger organization, or a combination.



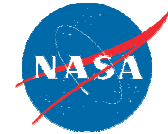
## (1/2) Alignment with Mission Directorate (MD) Needs

- SBIR contracts selected for award with MD assistance to ensure that SBIR awards align with MD needs.
- Alignment begins with Topic/Subtopic development, where descriptions of SBIR projects are designed to parallel MD technology roadmaps.
- Phase II selection includes outside peer evaluation of infusion and commercialization potential, and internal evaluation by MD personnel.

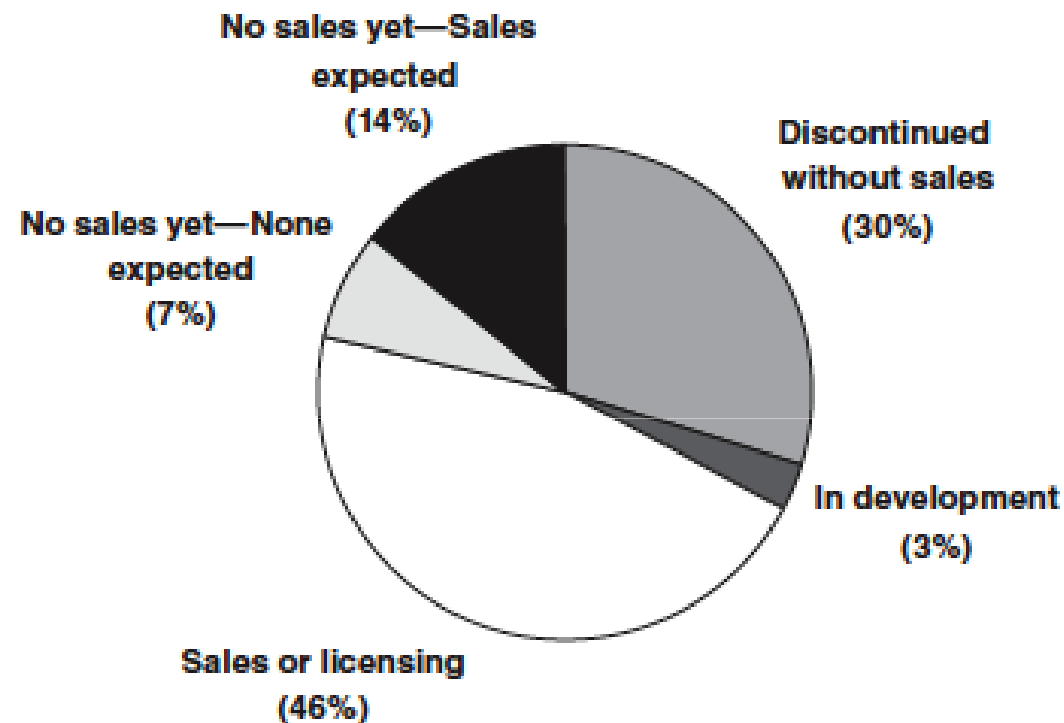
## (2/2) Alignment with Mission Directorate (MD) Needs



- There is no formal agency-wide SBIR policy at NASA to link SBIR contractors with prospective infusion customers in mission project offices.
- However, NASA field center processes task the SBIR COTR/Tech Monitor, subtopic manager, and Technology Infusion Manager with brokering such relationships.
- This process, as a minimum, involves identifying prospective Phase III investors among NASA mission programs and projects during Phase I and II proposal evaluation.

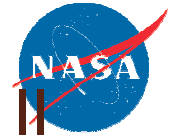


## (1/3) Distribution of Sales – NASA SBIR Phase II

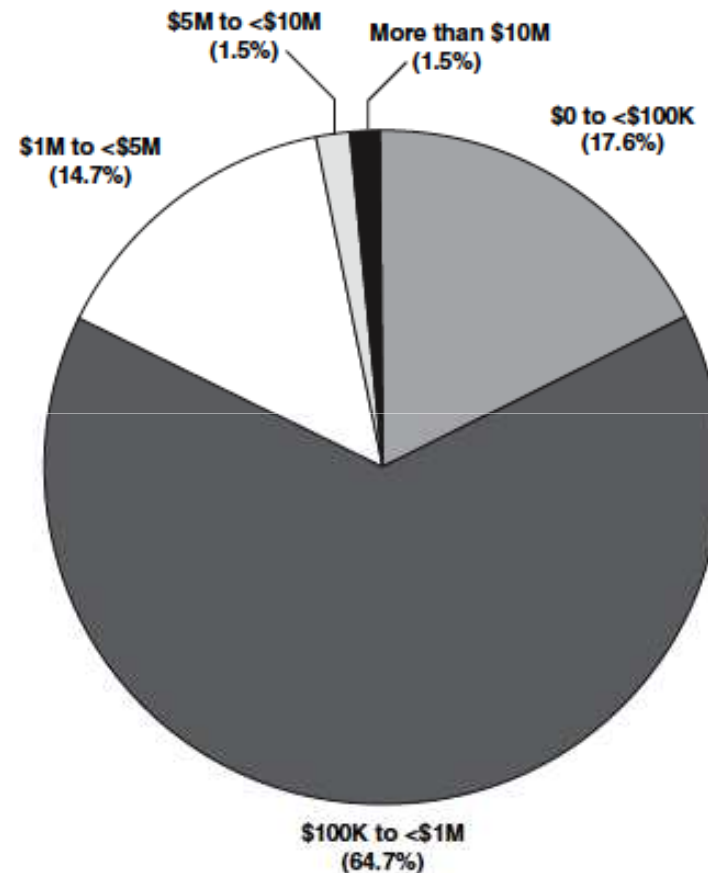


**FIGURE 4-1** Results from NASA Phase II projects.

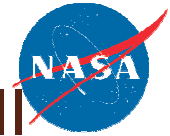
SOURCE: NRC Phase II Survey. Based on responses to Phase II Survey questions 1a, 1b, 3a, and 3b.



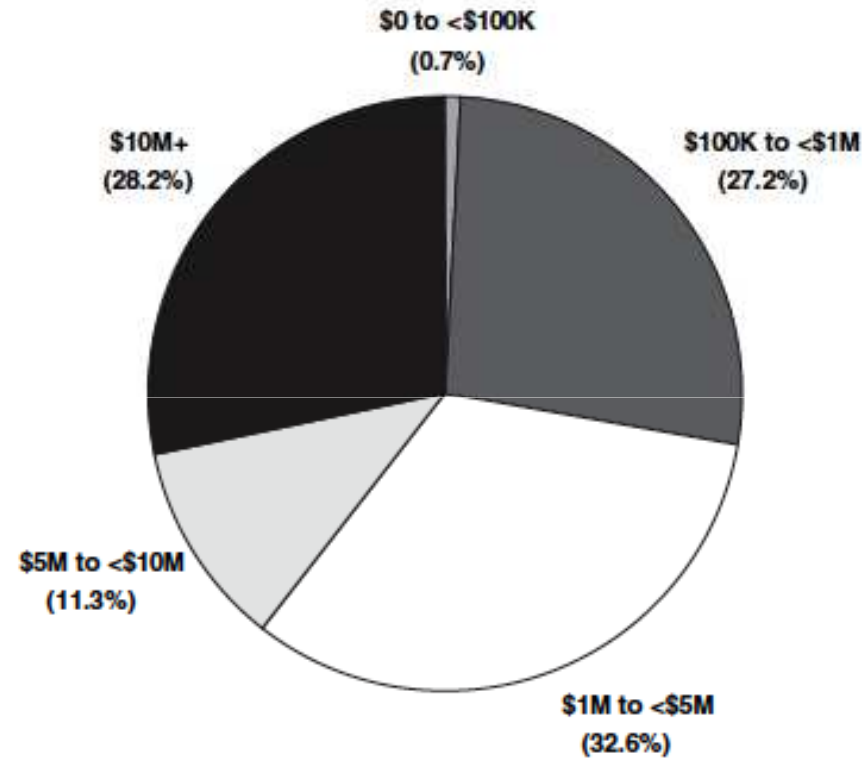
## (2/3) Distribution of Sales – NASA SBIR Phase II (by number of projects)



**FIGURE 4-2** Distribution of projects with sales >\$0.  
SOURCE: NRC Phase II Survey, Detailed responses to question 4b.

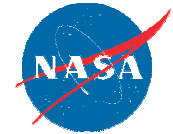


## (3/3) Distribution of Sales – NASA SBIR Phase II (by total sales dollars)



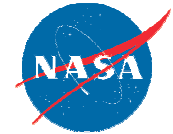
**FIGURE 4-3** Distribution of sales, by total sales (percent of total sales dollars). Detailed responses to question 4b.

SOURCE: NRC Phase II Survey.



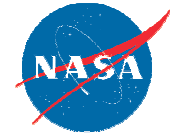
# Multiple Awards Can Increase Infusion Prospects

- Technologies often require multiple awards for successful development.
  - Firms receiving more NASA Phase II awards appear to produce better commercial outcomes.
  - Innovative new technologies often take more time and money to develop than a single set of Phase I and Phase II awards can provide.



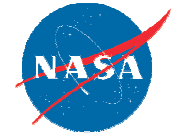
## Access to Prime Contractors

- NASA's SBIR infusion strategy focuses on developing “market pull” from MD project offices for SBIR technologies.
- Prime contractors have now begun to advocate for SBIR technologies in DoD programs.
  - Similar “market pull” from NASA primes for SBIR technologies can be expected to increase the commercialization of NASA's SBIR-funded technologies.
- Primes are also potential well-focused sources of Phase III development and commercialization funds.



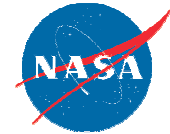
# ROSES NRA

- Research Opportunities In Space And Earth Sciences (ROSES) – 2009
- Solicits basic and applied research in support of NASA's Science Mission Directorate (SMD).
- Awards range from under \$100K per year for focused, limited efforts (e.g. data analysis) to more than \$1M per year for extensive activities (e.g. development of science experiment hardware). Typical period of performance is four years.
- Phase II JPL Tech Monitors are encouraged to refer their companies to appropriate funding sources in the NRA.
- ROSES awards can help increase the odds of a technology being considered for a future mission or instrument.
- Small companies may be interested in the NRA if they are looking for funds to supplement or to follow Phase II work.
  - Website:  
<http://nspires.nasaprs.com/external/solicitations/summary.do?method=init&soId={F35D3EEA-790E-663A-CEA2-ACE5B9E13A53}&path=open>



## Establishing NASA Points of Contact

- We may communicate with companies about NASA/JPL needs, technical relevance, applications, technical subtopic details and clarifications, etc.
  - The one exception is the Blackout Period (from Solicitation Release in early July through Phase I Awards Announcement in November).
- You are encouraged to contact us!
  - If you do not already have NASA technical point(s) of contact, you can contact the SBIR TIM or the Field Center Program Manager at the desired Center(s).
    - <http://sbir.gsfc.nasa.gov/SBIR/pgminfo.htm>
    - We can provide you with relevant leads and points of contact.



# Acknowledgements

- Andrew Gray
- Byron Jackson
- Indrani Graczyk
- Deb Wolfenbarger
- Janelle Saenz
- Ken Wolfenbarger

Copyright 2009 California Institute of Technology.  
Government sponsorship acknowledged.